



Documenting *Flora Indica*: Dysentery, William Roxburgh and medical botany

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Abstract

British interest in exploration and documentation of *Flora Indica* did not originate from the scientific interest in plants, but it was the result of exigencies of running the empire. When the civil and military explorers of the East India Company came from an oceanic climate to tropical region like India, they suffered with dysentery and similar other diseases. Subsequently, the quest for local remedies turned out to be the primary motto of the explorers of the Company. The Company asked their botanists and naturalists to explore Indian local remedies and specific plants for dysentery. In this context, William Roxburgh (1751–1815), the founding father of Indian Botany and the Director of Calcutta Botanical Garden, documented plants with astringent, laxative and purgative qualities as these were considered as the basic ingredients for curing dysentery. However, in the historiography on the relationship between disease and imperial exploration, dysentery has not been studied in detail. Subsequently, the contribution of Roxburgh to the field of medical botany is also ignored. Viewed in this context, the present paper deals with the William Roxburgh's effort in documentation and search of indigenous plants used in the treatment of dysentery.

Keywords Botany · Dysentery · Medical · William Roxburgh

1 Introduction

Dysentery had been more devastating cause of death for Europeans rather than death in the war field (Cook, 2007, pp. 193–194). The civil, military and scientific explorers of the East India Company who came from an oceanic climate to tropical region like India suffered with dysentery and other diseases. As a result of it, the quest for local remedies, search for herbs and naturopathy turned out to be the primary motto of the explorers of the Company. The Company asked their botanists and naturalists to explore Indian local remedies and specific plants for dysentery. In this context, William Roxburgh, the Director of Calcutta Botanical Garden, explored plants with astringent, emetic, laxative and purgative qualities as these were considered as the basic ingredients for curing the disease.

Along with the exigencies of running the empire, the British interest in natural exploration was part of creating a

Eurocentric 'planetary consciousness' which believed in 'an orientation toward interior exploration and the construction of global-scale meaning through the descriptive apparatuses of natural history' and further 'specified plants and animals in visual terms as discrete entities, subsuming and reassembling them in a finite, totalizing order of European making' (Pratt, 2008, p. 15, 38). The explorers began to classify the oriental world through the lens of West. However, in the historiography on this complex relationship between disease and imperial exploration, dysentery has not been studied in detail. There has been focus on plague, small pox, cholera and other diseases (Arnold, 1993; Harrison, 1994; Singh, 2005). Subsequently, the contribution of Roxburgh to the field of medical botany is also ignored. Viewed in this context the present paper deals with the efforts of William Roxburgh in searching and documenting the indigenous plants used in the treatment of dysentery.

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2 Historical retrospect

Dysentery which commences with deprived appetite, nausea and vomiting along with the frequent appearances of purging, griping pain and tenesmus has been mentioned in various commentaries since ancient times. The term ‘dysentery’ derived from the Greek word *dysenteria* was firstly employed by Hippocrates to distinguish a disease of the bowels characterized by the presence of blood in stools (Bankier, 1835, pp. 3–5). In the European world, the presence of dysentery can also be traced from the writing of Herodotus as it had affected the Persian army in Thessaly. However, the disease began to be heard of more frequently during the seventeenth century in Europe as it appeared as an epidemic along with fever and plague (Creighton, 1891, p. 328). The dysentery of London of 1666 which had followed after the bubonic plague of 1665 devastated the city. About the same time, the famous English herbalist, Culpeper, took great interest in studying the root of plant Rhubarb which was recommended by traditional Greek authorities on medical botany, such as Dioscorides and Theophrastus in curing dysentery (Farthing, 2015, pp. 152–158). After the resurgence of dysentery in 1762 and 1768 at London, the University of Edinburgh became an important center to study the disease under William Cullen, the Professor of Medicine at the University of Edinburgh. He pointed that the source of disease lied in the nervous system of human body which was contrary to the view of Herman Boerhaave, the Professor of Medicine at Leyden University, who had argued that the disease existed in the blood. Further William Cullen described liver issues, acrimony of the blood and bad water as the causes of dysentery (Cullen, 1775).

Traditionally the treatment of dysentery consisted largely of the use of oils, wine, dieting and plants with astringents and emetics qualities. In the beginning of the seventeenth century the employment of a genus of flowering plant, *Carapichea ipecacuanha*, which was the part of family Rubiaceae mainly found in South America, turned out to be the most helpful in the treatment of dysentery (Homans, 1859, p. 1087).¹ Thereafter a number of plants of this family like *Cephaelis ipecacuanha*, *Psychotria emetica*, *Richardsonia scabra*, *Rhodiola rosea*, *Borreria ferruginea* and *Chiococca anguifuga* and many others were searched in the Western hemisphere and used as the remedy to the disease. But in the East, the similar plant of Ipecacuanha was yet to

be discovered (Waring, 1861, p. 2). As a result, when the Europeans came to India, they suffered a lot from dysentery.

3 William Roxburgh, dysentery and documentation

During the early phase of the establishment of British Empire in India, dysentery emerged as a frequent disease. The unhealthy air, low-lying land, stench area and humidity in the coastal areas of tropical region played a devastating role in creating dysentery among settlers (Chakrabarti, 2010, pp. 88–89). It was reported in one of the articles written by William Roxburgh, published in the journal *Philosophical Transaction of the Royal Society of London*, that out of total 85 patients admitted to the Fort St. George Hospital, Madras in May 1778, 40 suffered from dysentery (Roxburgh, 1780, p. 271). Further, the severe effect of dysentery was later on described in detail by the Surgeon of Indian Army, M.G. Maxwell. Maxwell in his writing titled *A Practical Treatise on Epidemic Cholera, Ague, and Dysentery* reported that ‘at Madras, I saw several hundred cases of dysentery of the severest descriptions’ (Maxwell, 1838, pp. 129–32). In this situation, the demand of export of *Carapichea ipecacuanha* increased which forced the botanists of Empire to search for alternatives of this plant in the region along with the exploration of other floras with astringent, emetic, laxative and purgative properties (Home Department, December, 1787). In this context, William Roxburgh started to work in the field of medical botany.

William Roxburgh (1751–1815), after studying medicine and being matriculated at the University of Edinburgh around 1771, joined the East India Company ship ‘Houghton’ as a surgeon’s mate. In course of several voyages, he came to Madras and joined the Madras Medical Service as an Assistant Surgeon in the year 1776. Meanwhile, Roxburgh also received his first doctorate (MD) from Edinburgh University. Subsequently, he started to work on collecting plants as the Superintendent of Samalkota garden and replaced Patrick Russell as the Company Botanist in 1789. In 1793, he was appointed as the Superintendent of the Calcutta Botanical Garden after the death of Robert Kyd and occupied this position till the year 1813. During these years, Roxburgh focussed on studying and documenting medical and economic botany for exigencies of running the Empire. For imperial purpose, he sent many plant specimens and botanical illustrations, prepared with the help of locals, to Joseph Banks, the President of the Royal Society, who was collecting plants from across the world for Royal Botanic Garden, Kew (Robinson, 2003). During these years William Roxburgh published his writings titled *Plants of the Coast of Coromandel* (1795) and *Hortus Bengalensis* (1814). His documentation on the plants of India, *Flora Indica*; or

¹ Ipecacuanha was an emetic plant which was recommended in the chronic dysentery because of its quality to produce less irritability in body. In literal terms, Ipecacuanha is a Peruvian name derived from *Ipi* (root) and *Cacuanha* (district where the root was produced). It was first introduced in Europe by Helvetius during the reign of French monarch Louis XIV (1643–1715) for which he was awarded with a *douceur* of 25,000 Francs by the King.



Descriptions of Indian Plants (1820) was published after his death due to the effort of William Carey, an English Christian missionary and cultural anthropologist.

During the course of documentation of floras, Roxburgh took the help of local plant collectors, *Vaidyas* and *Ayurvedācāryas* in knowing about the medicinal plants and the indigenous treatment for dysentery. Subsequently, he came across a text book on medicine, *Cikitsā-Saṅgraha*, written by Chakrapani Dattā in eleventh century. The book, which was used from a long time as the text-book on pathology by the students of indigenous medicine, emphasized on taking vegetables as drugs to cure dysentery and other related diseases. William Roxburgh generally focused on exploring and documenting plants having the qualities of astringents, laxatives and purgatives along with finding a local alternative of *Carapichea ipecacuanha*.

In the field of medical botany, astringents were considered useful in absorption and preventing inflammation because of decongestant properties. It could help to bind loose stools, dry excretions, and stop bleeding. Astringents, which were ‘lodged universally in the solid parts of vegetables, most commonly in the bark, frequently in the woods, and sometimes in the roots’ worked as a tonic for the human body (Cullen, 1775, pp. 178–179). The laxatives and purgatives worked as emetics in quickening alvine evacuation. The laxatives operated so mildly as merely to produce the evacuation of the intestinal contents without causing increased secretion. Purgatives were used for increasing the peristaltic action of the intestines (Murray, 1808).

4 The astringents

William Roxburgh gave special attention to Myrobalans, the unripe drupe-like fruits of a tree in natural order *Combretaceae*, which were preferred as astringents by Indian physicians in curing dysentery. However, after sending the sample of Myrobalans to London, he did not receive encouraging reply as Europeans were not aware of the medicinal value of this plant. Roxburgh himself noted in his writing on the plants of Coromandel that the medical virtue of the Myrobalan ‘are discarded by the late writers on the *Materia medica* in Europe, and the College of London and Edinburgh have rejected them from their catalogues of official samples’ (Roxburgh, 1798, p. 53). With the help of a contemporary naturalist, John Fleming, and a ‘Hindu Druggist’, Roxburgh identified the medicinal virtue of the Myrobalans with its local name *Zengi Har*. Further he studied two particular species of Myrobalans, *Terminalia chebula* and *Terminalia citrina*, in detail from Indian *Materia medica*.

William Roxburgh also found a tree *Mimosa arabica* which was traditionally used as a source of diet and dye but possessed astringent qualities. His description noted that:

the unripe legumes possess still more astringency and make excellent ink with salt of steel...the exterior bark is of a dark, blackish colour, cracked in various directions and inert; but the interior is fibrous, pretty thick, of a reddish colour, and most powerful simple astringent. It is employed to tan leather, and to dye various shades of brown, with salt of steel. A storg decoction makes pretty good ink...the native mix the gum Arabic with the cake of the seeds of Sesamum (Gingely) left after the oil is expressed, which they use as an article of diet. It is also much in use amongst the dyers, chintz painters (Roxburgh, 1798, p. 27).

Roxburgh also observed that the gum-resins were very useful in medicine purposes as an astringent. With calomel, gum-resins worked as a powerful anti-spasmodic in mild dysentery. In this context, the species of *Acacia arabica* (Babul) was explored by Roxburgh. In his study on astringents, he also listed barks of various species like *Dalbergia melanoxylon* (Ebony), *Plantago ispaghula* (Ispagol), *Soymida febrifuga* (Rohun) and *Nux vomica* (Quaker Buttons) which were useful in dysentery. The bark of Rohun, Ebony with Pepper and bruised seeds of Ispagol moistened with water formed a good emollient poultice and was found useful in intermittent fevers and in advanced stages of dysentery.

During the course of stay at Calcutta Botanical Garden, William Roxburgh was in search of Catechu as it was one of the official drugs recommended by the London Pharmacopoeia, 1721, for dysentery, pyrosis sore throat and ulcerations of the mouth (Waring, 1868). Catechu, considered as a tonic and powerful astringent which helped in relaxing intestinal membrane, was extracted from the wood of *Acacia catechu*. The first detailed description of Catechu and its process of preparation came to be known in Europe was by Portuguese physician Garcia de Orta. Dr Campbell of Bencoolen described the drug and the process of making it to Roxburgh (Watt, 2014, p. 10). Roxburgh found a Pale Catechu, *Uncaria Gambir*, in Bengal. The extract obtained from leaves was known as Gambier or the official ‘Pale Catechu’. The Gambier varied in shape and size from being circular to angular to cylindrical (Pereira, 1837, pp. 104–106). After Roxburgh, Benjamin Heyne also studied Catechu in detail in his study on tracts, history and statistics of India in the year 1814.

Roxburgh also tried to find similar plants of Calumba wood which was a valuable medicine found in Sri Lanka for rectifying the tone of the stomach and alimentary canal injured by dysentery. General Macdowall sent wood specimens from Ceylon to Roxburgh and he found similarities of Calumba wood with the genus *Menispermum*, found in India (Hanbury, 1876, pp. 57, 58). Later in this regard, Daniel Hanbury wrote an article entitled ‘On an article imported as



Calumba Wood, supposed to be the produce of a *Menispermum* in the *Transactions of the Pharmaceutical Society* in 1851.

5 The laxative and purgatives

When William Roxburgh was compiling his book on the plants of the coast of Coromandel, he came across a plant *Agle marmelos* or Bael fruit referred in *Cikitsā-Saṅgraha* (Roxburgh, 1798, p. 23). The Bael plant had high regard among the local physicians because of its laxative quality. It contained tannin and a large amount of peculiar mucilage and astringent. In the acute stage of dysentery, the unripe fruit was very useful. As Roxburgh himself observed that:

the fruit, delicious to the taste, and exquisitely fragrant, is not only nutritious, but possesses a laxative and aperient quality, confirmed by experience, which renders it particularly serviceable in habitual costiveness (ibid.).

The Bael plant was an important finding which later created a spur in the medicinal circle. Whitelaw Ainslie documented its medicinal properties as Bengal quince in his book *Materia Indica* (1926). Baboo Ramcomol Shen published a paper in the *Transactions of the Medical and Physical Society of Calcutta* under Carey in the year 1829. Thereafter a series of works mentioned this plant including O'Shaughnessy's *The Bengal Dispensary and Pharmacopoeia* (1841), A. Grant's *Indian Annals* (1855), and John Waring *Pharmacopoeia of India* (1868). A. Grant and John Waring also described the process of preserving Bael by making it in the form of syrup/*sherbat*. In fact, no drug was so well received and praised by European physicians than this fruit. Soon, it entered in the London market and Matthew Pound, a Dispensing Chemist, advertised it in the journal *Lancet* in 1850. The advertisement was as follows:

Mr. Pound begs to inform the medical boards of hospitals, dispensaries, &c., and the medical profession generally, that he has received a fresh supply of that valuable medicine, the Indian bael, (so usefull in dysentery, diarrhea, and irritation of the mucous membrane), and now prepared to supply it in any quantity.

To those who are not yet acquainted with its peculiar virtues, it may be necessary to remark, that, whilst it arrests dysentery, checks diarrhea, and allays irritation of the mucous membrane, it does not produce constipation, but the system is thereby restored to its accustomed state, without further inconvenience. The decoction is the most general form of administration, but the wine and extract, in many cases, answer equally well.

Table 1 An account of the *Senna* quantities sold at the East India during the years 1804 to 1807. Source: Milburn, 1813, p. 109

Year	Total sale	
	Cwt	£
1803	12,889	793
1804	22,965	1105
1805	44,000	2070
1806	22,775	781
1807	65,347	2425

The Bael is imported by Matthew Pound, Dispensing Chemist, 198, Oxford-street, London (*The Lancet*, 17 August 1850).

Amidst the growing demand of this laxative plant in London, many writings were done on its properties in the second half of nineteenth century in Britain. A few of them included: (i) Joseph Adolphus, *Remarks on the use of the Indian Bael or Bela in dysentery, diarrhea*, 1853, (ii) H. O. Remfry, *Notes on the nature and uses of Indian Bael*, 1855 and (iii) Joseph Fayrer, *On the Bael fruit, and its medicinal properties and uses*, 1881.

In these ways, Bael became the part of British pharmacopoeia. Another laxative documented by William Roxburgh which created its market in Britain was *Cassia senna* (*senna*). *Cassia senna* was widely used in the problem in bowel movement and was medicinally considered as one of the most valuable sorts which operated with mildness and certainty. The purgative qualities of *senna* were traditionally known to the Arab physicians, Serapion and Mesue (Woodville, 1810, p. 442). In England, *Senna* was difficult to be cultivated therefore, they imported it from Alexandrians, Tripolians, and East Indians. The *Senna* in common use amongst Indian practitioners was the blunt-leaved, *Senna italica*. It was a common plant on the Coromandel Coast. However, its use as a medicine was too limited in the region (Stephenson & Churchill, 1834). Roxburgh's study on *Senna* and its medicinal value were documented in *Hortus Bengalensis* and *Flora Indica*. Roxburgh described twenty-two species of *Senna* (Roxburgh, 1832, pp. 341–354). Further, the plant was also introduced at the Botanic Garden of Calcutta in the year 1800 (Wallich, 1837, p. 353).

After documentation by Roxburgh, *Senna* demand increased from £793 to £2,425 during the period between 1803 and 1807 (Table 1). The finest quality of *Senna* leaves, found in Tirunelveli district of Madras Presidency, was in high demand. The value of Tirunelveli's *Senna* varied from 7d. to 9.5d. per lb as compared to other general Indian *Senna* leaves whose value remained at 2d. to 3d. per lb (Balfour, 1857, pp. 1676–1677).

In further documenting the plants with medicinal value, Roxburgh also tried to find alternative of laxative and



purgative plant like Ipecacuanha. In this regard, he documented a plant, *Asclepias asthmatica* (Untamool), found in Bengal and Coromandel regions with the help of a German Botanist, J. Koenig. After the finding, Roxburgh described that:

at the Coromandel, the roots of this plant have often been used as a substitute for Ipecacuanha. I have often prescribed it myself, and always found it answer as well as I could expect ipecacuanha to do...It was a very useful medicine with our Europeans who were unfortunately prisoners with Hyder Ali, during the war of 1780–3. In a pretty large dose it answered as an emetic, in smaller doses often repeated, as a cathartic, and in both ways very effectually (Cooke, 1871, p. 165).

Dr. Kirkpatrick also wrote about the use of the juice and root powder of the plant by natives of Mysore as an emetic. He noted that, ‘I have administered this medicine in, at least, 1,000 cases and found it most valuable in dysentery and as a simple emetic’ (Waring, 1861, p. 5). The medicinal value of Ipecacuanha was also tested in France by a physician, Adrien Helvetius, who was later awarded by the King Louis XIV (Schiebinger, 2004, pp. 165, 190).

Other plants of the family of Ipecacuanha, such as *Posoqueria dumetorum* and *Paedria foetida* (Somaraji) were also documented by Roxburgh. However, he could not carry out his research forward as his notes were lost during a storm in 1787. He himself wrote that:

I had made and noted down many observations on its uses, when in large practice in the General Hospital at Madras in 1776, 77, and 78, but lost them, with all my other papers, by the storm and inundation at and near Coringa in May 1787 (Roxburgh, 1832 p. 34)

Asclepias asthmatica later came to be known as ‘Indian Ipecacuanha’ and became a source of writing for British botanists like W. O’Shaughnessy, Fleming and others. It was admitted as officinal in the *Bengal Pharmacopoeia* in 1844. In these ways, William Roxburgh played an important role in preparing *Materia Medica* and *Pharmacopoeia* of India.

6 Conclusion

British interest in exploration and documentation of *Flora Indica* did not originate from the scientific interest in botany, but it was the result of exigencies of running the Empire and interest in ‘planetary consciousness’. When the civil and military explorers of the Company came from an oceanic climate to India, they suffered with dysentery and similar other diseases. In this regard, the botanists like William Roxburgh were instructed from authorities in London to explore the

native medical botany. Roxburgh documented the specific plants for dysentery with the aid of local physicians in India. He focused on searching plants with astringents, purgatives and laxatives qualities which were pivotal in the treatment of dysentery.

During the course of exploration, Roxburgh documented plants like Myrobalan, Catechu Bael, Senna, and alternatives of Ipecacuanha. These efforts widened the horizons of medical botany and helped in curing Europeans with dysentery. His works became the basic foundation for further botanists like Whitelaw Ainslie, W. O’Shaughnessy, Fleming and others. In light of William Roxburgh’s contribution in exploring and documenting indigenous plants, Tim Robinson (2008) called him the ‘Founding Father of Indian Botany’.

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